

## REMARKS

By this amendment, Applicants have amended claims 1, 8, 10-11, 13-15, 17, 21, 23, and 28. As a result, claims 1-3, 7-8, 10-11, 13-17, 20-21, 23-26, and 28-29 remain pending in this application. These amendments are being made to facilitate early allowance of the presently claimed subject matter. Applicants do not acquiesce in the correctness of the objections and rejections and reserve the right to pursue the full scope of the subject matter of the original claims, or claims that are potentially broader in scope, in the current and/or a related patent application. Reconsideration in view of the following remarks is respectfully requested.

In the Final Office Action, the Office rejects claims 1-3, 7-8, 10, 13-17, 20, 24-26, and 29 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ryzhii et al., “Terahertz photomixing in quantum well structures”, J. App. Phys., Vol. 91, No. 4, pp. 1875-1881, 2002 (Ryzhii) in view of Sohn et al., “Tunable terahertz generation using femtosecond pulse shaping”, Appl. Phys. Lett., Vol. 81, No. 1, pp. 13-15, 2002 (Sohn). Applicants traverse these rejections for the following reasons.

Initially, Applicants note that in rejecting the claims, the Office, *inter alia*, defines the level of ordinary skill as “extremely high”, and alleges that “the [Supreme] Court might easily have said that... the person of ordinary skill is a person of extraordinary creativity.” Final Office Action, p. 6, second paragraph (emphasis in original). Further, in addressing the level of ordinary skill in a subsequent obviousness rejection later in the Final Office Action, the Office states that “[t]he level of skill in the semiconductor art is a level of creativity, scientific thinking, and applied problem-solving unprecedented in the history of Man”. Final Office Action, p. 14.

In support of its findings, the Office states that “[m]any prior art solutions in this field have won Nobel prizes”, and lists several Nobel laureates and notes that there are “probably a

half dozen more this writer has forgotten.” Final Office Action, pp. 5-6. Applicants note that the presence of several Nobel laureates in a field, such as the semiconductor device industry, is largely irrelevant to a finding of the level of ordinary skill as provided by the MPEP and case law. For example, the MPEP states that “[t]he examiner must ascertain what would have been obvious to one of ordinary skill in the art at the time the invention was made, and not to the inventor, a judge, a layman, those skilled in remote arts, or to geniuses in the art at hand.” MPEP, 2141.03, III; citing *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 218 USPQ 865 (Fed. Cir. 1983), *cert. denied*, 464 U.S. 1043 (1984).

Applicants respectfully submit that the Office’s finding that the level of ordinary skill includes “extraordinary creativity” and is “unprecedented in the history of Man” extends well beyond the support provided by the Office and is unduly high. Since the Office applied an unduly high level of ordinary skill in analyzing the claimed inventions, Applicants respectfully request withdrawal of the obvious rejections.

With respect to claim 1, Applicants submit that the Office fails, *inter alia*, to show that the proposed combination of Ryzhii and Sohn teaches or suggests exciting a carrier gas by generating a laser pulse with a laser and shining the laser pulse directly onto a semiconducting device as in amended claim 1.

In Ryzhii, photomixing of infrared signals is used to generate tunable terahertz radiation. Ryzhii, Abstract. In particular, a quantum well is excited by two infrared laser beams with different frequencies. Ryzhii, p. 1876, second column, last paragraph. The plasma oscillations excited by modulated infrared radiation (two laser beams with close photon energies) result in the electromagnetic radiation. Ryzhii, p. 1879, second column, last paragraph. The Office states that “[t]he difference between the prior art method disclosed by Ryzhiia (sic) et al. and the

method of claims 1-3, 7, and 24 is that, where claims 1-3, 7, and 24 require a step of shining a laser pulse having a duration of approximately one femtosecond to ten picoseconds, Ryzhii (sic) et al.'s method includes a step of shining two lasers with a difference frequency." Final Office Action, p. 7. Applicants note that the method of Ryzhii also differs from the method of claim 1 in that Ryzhii uses two laser beams, or continuous wave lasers, whereas the method of claim 1 uses a laser pulse generated by a laser.

In Sohn, a combination of photomixing and pulse shaping are used to make a tunable terahertz source. Sohn, Abstract. In particular, a femtosecond laser pulse is diffracted, two specific wavelengths of a fixed spectral width are selected from the diffracted pulse, and these wavelengths are collimated to form a shaped femtosecond pulse. Sohn, p. 13, second column – p. 14, first column; FIGS. 1 and 2. Sohn's analysis indicates "that indeed, the THz generation is via photomixing." Sohn, p. 14, first column, last paragraph.

As a result, both Ryzhii and Sohn teach THz generation via photomixing. To this extent, both approaches combine two different frequencies to generate the THz radiation. In particular, Ryzhii does so using two different sources of continuous wave infrared radiation, while Sohn does so by processing a laser pulse to form a shaped femtosecond pulse. In contrast, the invention of claim 1 excites a carrier gas by generating a laser pulse with a laser and shining the laser pulse directly onto a semiconducting device. To this extent, the invention of claim 1 does not use any type of photomixing as shown and described in both Ryzhii and Sohn.

In light of the above, Applicants respectfully request withdrawal of the rejections of claim 1 and claims 2-3, 7, and 24, which depend therefrom, as allegedly being unpatentable over Ryzhii in view of Sohn.

With respect to independent claims 8, 10, and 13-15, Applicants note that the Office presents similar arguments as those presented above with respect to claim 1 in each of these rejections. Further, Applicants have amended each of these claims to include similar limitations as discussed above with respect to claim 1. As a result, Applicants respectfully request withdrawal of the rejections of claims 8, 10, and 13-15, and any dependent claims thereof, as allegedly being unpatentable over Ryzhii in view of Sohn.

With further respect to claim 8, Applicants submit that the Office fails, *inter alia*, to show that the proposed combination of Ryzhii and Sohn teaches or suggests adjusting a frequency of the radiation, which includes adjusting a gate length for the gate as in claim 8. In support of its rejection, the Office cites a portion of Ryzhii that discusses the length of a quantum well channel. As illustrated in FIG. 1(b) of Ryzhii, the gate length is unrelated to the length of the quantum well channel. Applicants submit that Sohn fails to address this deficiency of Ryzhii. As a result, Applicants again respectfully request withdrawal of the rejection of claim 8 as allegedly being unpatentable over Ryzhii in view of Sohn.

With further respect to claim 16, Applicants submit that the Office fails, *inter alia*, to show that the proposed combination of Ryzhii and Sohn teaches or suggests adjusting the frequency of the radiation by using a plurality of heterodimensional diodes as in claim 16. Applicants note that Ryzhii and Sohn both fail to teach the use of a plurality of heterodimensional diodes, let alone using the plurality of heterodimensional diodes to adjust the frequency of the radiation as in claim 16. Further, the Office does not allege that either Ryzhii or Sohn teaches such a feature. As a result, Applicants again respectfully request withdrawal of the rejection of claim 16 as allegedly being unpatentable over Ryzhii in view of Sohn.

Further, the Office rejects claims 11, 21, and 28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Ryzhii in view of Sohn in further view of Peralta et al., “Terahertz photoconductivity and plasmon modes in double-quantum-well field-effect transistors”, Appl. Phys. Lett., Vol. 81, No. 9, pp. 1627-1629, 2002 (Peralta). Applicants note that the Office presents similar arguments as those presented above with respect to claim 1 in each of these rejections with respect to Ryzhii and Sohn and the Office’s interpretations thereof. Further, Applicants have amended each of these claims to include similar limitations as discussed above with respect to claim 1. Applicants submit that Peralta fails to address the deficiencies of Ryzhii and Sohn as discussed above. As a result, Applicants respectfully request withdrawal of the rejections of claims 11, 21, and 28 as allegedly being unpatentable over Ryzhii in view of Sohn in further view of Peralta.

Applicants appreciate the Office’s indication of allowable subject matter in claim 23. By this response, Applicants have amended claim 23 to be in independent form. As a result, Applicants respectfully submit that claim 23 is in condition for allowance.

Applicants submit that each of the pending claims is patentable for one or more additional unique features. To this extent, Applicants do not acquiesce to the Office’s interpretation of the claimed subject matter or the references used in rejecting the claimed subject matter. Additionally, Applicants do not acquiesce to the Office’s combinations and modifications of the various references or the motives cited for such combinations and modifications. These features and the appropriateness of the Office’s combinations and modifications have not been separately addressed herein for brevity. However, Applicants reserve the right to present such arguments in a later response should one be necessary and/or in

a related patent application, either of which may seek to obtain protection for claims of a potentially broader scope.

In light of the above, Applicants respectfully submit that all claims are in condition for allowance. Should the Examiner require anything further to place the application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the number listed below.

Respectfully submitted,

/John LaBatt/

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